



MicroLogix™ 1200 Analog Output Module

(Catalog Number 1762-OF4)

Inside...

For More Information	2
Description	3
Installation	3
Mounting.....	5
System Assembly.....	7
Field Wiring Connections.....	7
Output Type Selection.....	8
Wiring	8
I/O Memory Mapping	11
Specifications	16
Hazardous Location Considerations	18
Environnements dangereux	19

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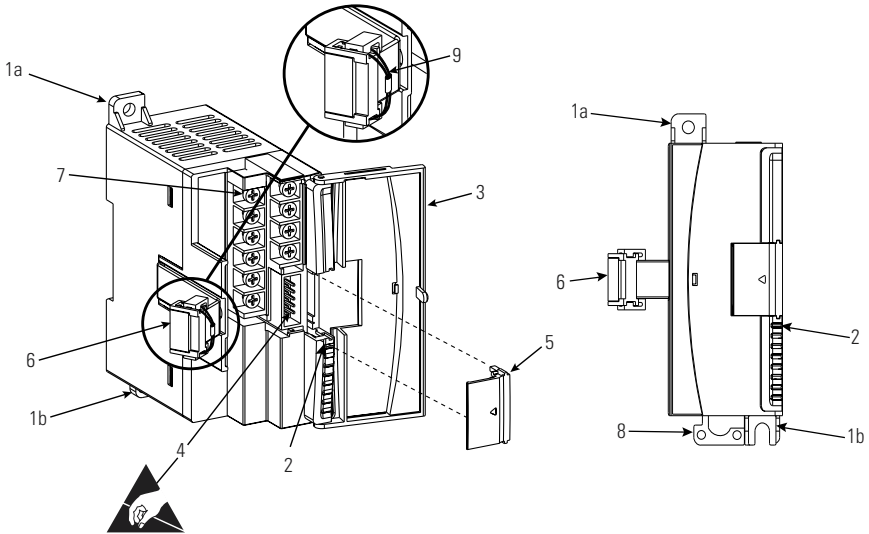
For More Information

For	Refer to this Document	Pub. No.
Information on installing, wiring, and operating a MicroLogix 1200 Programmable Controller	MicroLogix 1200 Programmable Controllers User Manual	1762-UM001
Installation guide for the MicroLogix 1200 Programmable Controller.	MicroLogix 1200 Programmable Controllers Installation Instructions	1762-IN006
Installation guide for the MicroLogix 1200 Memory Module and Real Time clock.	MicroLogix 1200 Memory Module and/or Real Time Clock Installation Instructions	1762-IN001
More information on proper wiring and grounding techniques.	Industrial Automation Wiring and Grounding Guidelines	1770-4.1

If you would like a manual, you can:

- download a free electronic version from the internet:
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- purchase a printed manual by:
 - contacting your local distributor or Rockwell Automation representative
 - visiting www.theautomationbookstore.com and placing your order
 - calling 1.800.963.9548 (USA/Canada)
or 001.330.725.1574 (Outside USA/Canada)

Description



Item	Description	Item	Description
1a	upper panel mounting tab	5	bus connector cover
1b	lower panel mounting tab	6	flat ribbon cable with bus connector (female)
2	power diagnostic LED	7	terminal block
3	module door with terminal identification label	8	DIN rail latch
4	bus connector with male pins	9	pull loop

Installation

1762 I/O is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2⁽¹⁾) and to circuits not exceeding Over Voltage Category II⁽²⁾ (IEC 60664-1).⁽³⁾

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.

(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Prevent Electrostatic Discharge

ATTENTION



Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
 - Wear an approved wrist-strap grounding device.
 - Do not touch the bus connector or connector pins.
 - Do not touch circuit components inside the module.
 - If available, use a static-safe work station.
 - When not in use, keep the module in its static-shield box.
-

Remove Power

ATTENTION



Remove power before removing or installing this module. When you remove or install a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment
- causing permanent damage to the module's circuitry

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

Mounting

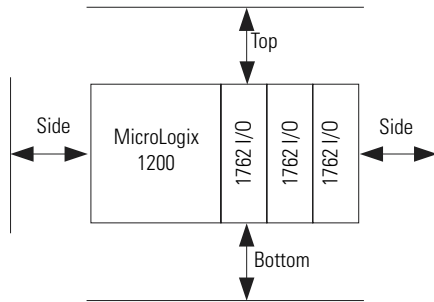
ATTENTION



Do not remove protective debris strip until after the module and all other equipment near the module is mounted and wiring is complete. Once wiring is complete and the module is free of debris, carefully remove protective debris strip. Failure to remove strip before operating can cause overheating.

Minimum Spacing

Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50.8 mm (2 in.) of space on all sides for adequate ventilation, as shown:



TIP

1762 expansion I/O may be mounted horizontally only.

ATTENTION



During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage when power is applied to the module.

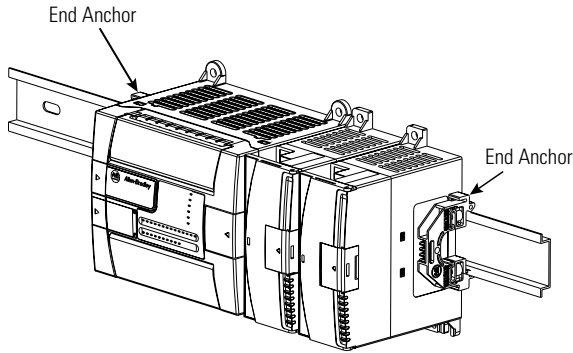
DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting the module on a DIN rail, close the DIN rail latch. Press the DIN rail mounting area of the module against the DIN rail. The latch will momentarily open and lock into place.

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Use DIN rail end anchors (Allen-Bradley part number 1492-EA35 or 1492-EAH35) for environments with vibration or shock concerns.



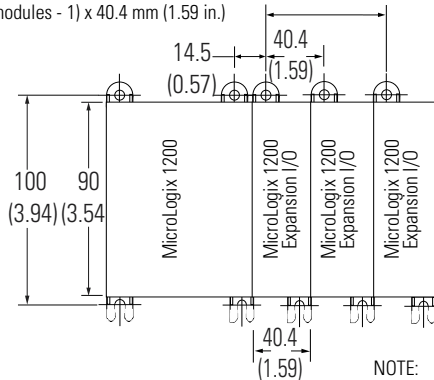
TIP

For environments with extreme vibration and shock concerns, use the panel mounting method described below, instead of DIN rail mounting.

Panel Mounting

Use the dimensional template shown below to mount the module. The preferred mounting method is to use two M4 or #8 panhead screws per module. M3.5 or #6 panhead screws may also be used, but a washer may be needed to ensure a good ground contact. Mounting screws are required on every module.

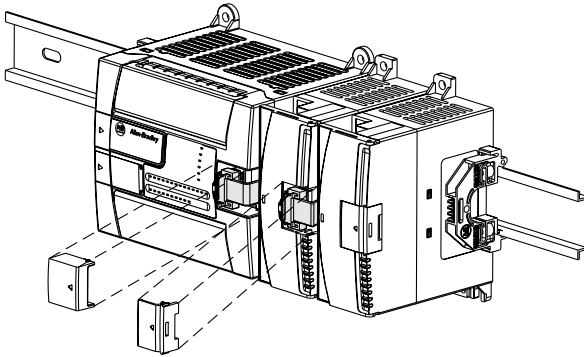
For more than 2 modules: (number of modules - 1) x 40.4 mm (1.59 in.)



NOTE:
Hole spacing tolerance:
±0.4 mm (0.016 in.).

System Assembly

The expansion I/O module is attached to the controller or another I/O module by means of a ribbon cable *after* mounting as shown below.

**TIP**

Use the pull loop on the connector to disconnect modules. Do not pull on the ribbon cable.

WARNING**EXPLOSION HAZARD**

- In Class I, Division 2 applications, the bus connector must be fully seated and the bus connector cover must be snapped in place.
- In Class I, Division 2 applications, all modules must be mounted in direct contact with each other as shown on page 5. If DIN rail mounting is used, an end stop must be installed ahead of the controller and after the last 1762 I/O module.

Field Wiring Connections

Grounding the Module

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the module's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1, for additional information.

Output Type Selection

The output type selection, current or voltage, is made by wiring to the appropriate terminals, Iout or Vout, *and* by the type/range selection bits in the Configuration Data File (see page 14).

Wiring

System Wiring Guidelines

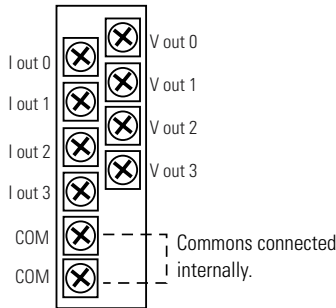
Consider the following when wiring your system:

- The analog common (COM) is not connected to earth ground inside the module. All terminals are electrically isolated from the system.
- Channels are not isolated from each other.
- Use Belden™ 8761, or equivalent, shielded wire.
- Under normal conditions, the drain wire (shield) should be connected to the metal mounting panel (earth ground). Keep shield connection to earth ground as short as possible.
- To ensure optimum accuracy for voltage type outputs, limit overall cable impedance by keeping all analog cables as short as possible. Locate the I/O system as close to your voltage type sensors or actuators as possible.

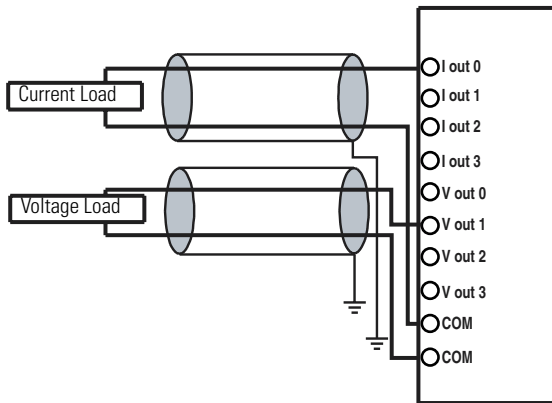
ATTENTION

Analog outputs may fluctuate for less than a second when power is applied or removed. This characteristic is common to most analog outputs. While the majority of loads will not recognize this short signal, it is recommended that preventive measures be taken to ensure that connected equipment is not affected.

Terminal Block Layout



Differential Sensor Transmitter Types

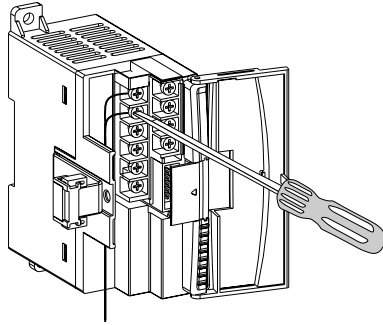


TIP

Grounding the cable shield at the module end only usually provides sufficient noise immunity. However, for best cable shield performance, earth ground the shield at both ends, using a 0.01 μF capacitor at one end to block AC power ground currents, if necessary.

Labeling the Terminals

A write-on label is provided with the module. Mark the identification of each terminal with permanent ink, and slide the label back into the door.



Wiring the Finger-Safe Terminal Block

ATTENTION



Be careful when stripping wires. Wire fragments that fall into a module could cause damage when power is applied. Once wiring is complete, ensure the module is free of all metal fragments.

When wiring the terminal block, keep the finger-safe cover in place.

1. Route the wire under the terminal pressure plate. You can use the stripped end of the wire or a spade lug. The terminals will accept a 6.35 mm (0.25 in.) spade lug.
2. Tighten the terminal screw making sure the pressure plate secures the wire. Recommended torque when tightening terminal screws is 0.904 Nm (8 in-lbs).
3. After wiring is complete, remove the debris shield.

TIP

If you need to remove the finger-safe cover, insert a screw driver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way.

Wire Size and Terminal Screw Torque

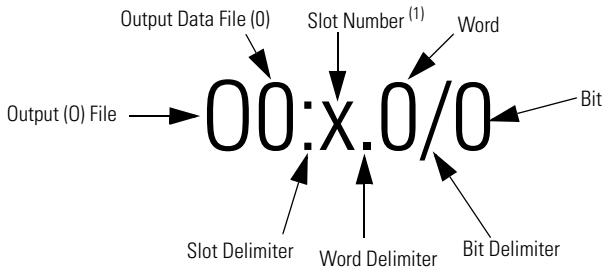
Each terminal accepts up to two wires with the following restrictions:

Wire Type		Wire Size	Terminal Screw Torque
Solid	Cu-90°C (194°F)	#14 to #22 AWG	0.904 Nm (8 in-lbs)
Stranded	Cu-90°C (194°F)	#16 to #22 AWG	0.904 Nm (8 in-lbs)

I/O Memory Mapping

Addressing

The addressing scheme for 1762-OF4 is shown below.



(1) I/O located on the controller (embedded I/O) is slot 0. I/O added to the controller (expansion I/O) begins with slot 1.

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Input Data File

For each module, slot x, words 0 and 1 contain the analog output module status data for use in the control program.

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Reserved												S03	S02	S01	S00
1	Reserved								U00	O00	U01	O01	U02	O02	U03	O03

The bits are defined as follows:

- SOx = General status bits for output channels 0 through 3. This bit is set when an error (over- or under-range) exists for that channel, or there is a general module hardware error.
- O0x = Over-range flag bits for output channels 0 through 3. These bits indicate an input signal above the user range and can be used in the control program for error detection. The module continues to convert analog data to the maximum full range value while this bit is set (1). The bit is reset (0) when the error clears.
- U0x = Under-range flag bits for output channels 0 through 3. These bits indicate an input signal below the user range. They can be used in the control program for error detection. The module continues to convert analog data to the minimum full range value while this bit is set (1). The bit is reset (0) when the error clears.

Output Data File

For each module, slot x, words 0 through 3 contain the channel output data.

Raw/Proportional Format

Word	Bit Position																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0	0	Channel 0 Data 0 to 32,760													0	0	0
1	0	Channel 1 Data 0 to 32,760													0	0	0
2	0	Channel 2 Data 0 to 32,760													0	0	0
3	0	Channel 3 Data 0 to 32,760													0	0	0

Words 0 through 3 contain the analog output data for channels 0 through 3, respectively. The module ignores the “don’t care” bits (0 through 2), but checks the sign bit (15). If bit 15 equals 1, the module sets the output value to 0V or 0 mA.

Scaled-for-PID Format

Word	Bit Position																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0	0	0	Channel 0 Data 0 to 16,380													0	0
1	0	0	Channel 1 Data 0 to 16,380													0	0
2	0	0	Channel 2 Data 0 to 16,380													0	0
3	0	0	Channel 3 Data 0 to 16,380													0	0

Words 0 through 3 contain the analog output data for channels 0 through 3, respectively. The module ignores the “don’t care” bits (0 and 1), but checks the sign bit (15), and bit 14. If bit 15 equals 1, the module sets the output value to 0V or 0 mA. If bit 15 equals zero and bit 14 equals 1, the module sets the output value to 10.5V dc or 21 mA.

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Configuration Data File

The configuration of the format for analog outputs is made at going to run (GTR). Changes made to the configuration file while in run mode have no effect.

The configuration table for analog outputs is shown in the table below.

Configuration Data File

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	reserved	Data Format Output Channel 0			Type/Range Select Output Channel 0				reserved							
1		Data Format Output Channel 1			Type/Range Select Output Channel 1				reserved							
2		Data Format Output Channel 2			Type/Range Select Output Channel 2				reserved							
3		Data Format Output Channel 3			Type/Range Select Output Channel 3				reserved							
4	reserved															
5	reserved															
6	reserved															
7	reserved															

Bit 15 and Bits 7 through 0 - Reserved

These bits are reserved and are not checked by the module.

Data Format (Bits 14 through 12)

These bits indicate the format of the data as shown in the following table. Other combinations of these bits are not supported and result in an error.

Bit Settings			Data Format
14	13	12	
0	0	0	Raw/Proportional
0	1	0	Scaled for PID
other			Not Supported

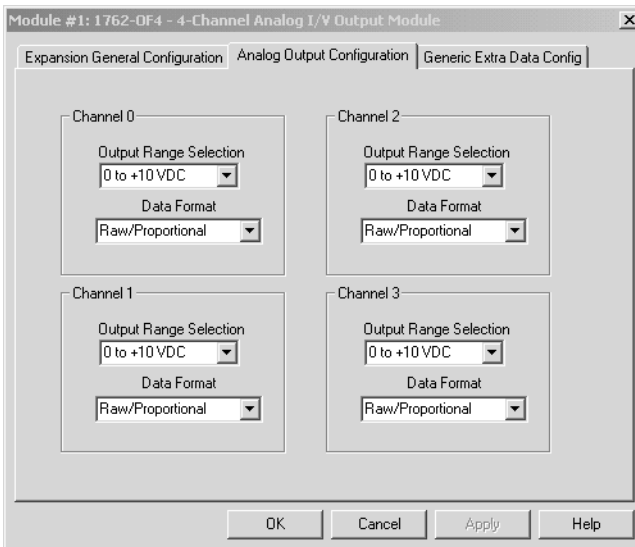
Type/Range Select (Bits 11 through 8)

These bits indicate the type and range as in the following table. Other combinations of these bits are not supported and result in an error.

Bit Settings				Data Format
11	10	9	8	
0	0	0	0	Voltage Mode 0 to 10V dc
0	0	1	1	Current Mode 4 to 20 mA
other				Not Supported

Configuration via RSLogix 500

The module can be configured using RSLogix 500 programming software, as shown below.



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Specifications

General Specifications

Specification	Value
Dimensions	90 mm (height) x 87 mm (depth) x 40 mm (width) height including mounting tabs is 110 mm 3.54 in. (height) x 3.43 in. (depth) x 1.58 in. (width) height including mounting tabs is 4.33 in.
Approximate Shipping Weight (with carton)	235 g (0.517 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +55°C (-32°F to +131°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet)
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. max. peak-to-peak
Shock	Operating: 30G
Bus Current Draw (max.)	40 mA at 5V dc 165 mA at 24V dc
Analog Normal Operating Range (bipolar)	Voltage: 0 to 10V dc Current: 4 to 20 mA
Full Scale ⁽¹⁾ Analog Ranges	Voltage: 0 to 10.5V dc Current: 0 to 21 mA
Resolution	12 bits (unipolar)
Repeatability ⁽²⁾	±0.1%
Output Group to System Isolation	30V ac/30V dc rated working voltage ⁽³⁾ (IEC Class 2 reinforced insulation) type test: 500V ac or 707V dc for 1 minute
Module Power LED	On: indicates power is applied.
Recommended Cable	Belden™ 8761 (shielded)
Vendor I.D. Code	1
Product Type Code	10
Product Code	66
Agency Certification	C-UL certified (under CSA C22.2 No. 142) UL 508 listed CE compliant for all applicable directives C-Tick marked for all applicable acts
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Noise Immunity	NEMA standard ICS 2-230
Radiated and Conducted Emissions	EN50081-2 Class A

Specification	Value
<i>Electrical /EMC:</i>	<i>The module has passed testing at the following levels:</i>
ESD Immunity (EN61000-4-2)	4 kV contact, 8 kV air, 4 kV indirect
Radiated Immunity (EN61000-4-3)	10 V/m, 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier
Fast Transient Burst (EN61000-4-4)	2 kV, 5 kHz
Surge Immunity (EN61000-4-5)	1 kV galvanic gun
Conducted Immunity (EN61000-4-6)	10V, 0.15 to 80 MHz ⁽⁴⁾

- (1) The over- or under-range flag comes on when the normal operating range (over/under) is exceeded. The module continues to convert the analog output up to the maximum full scale range.
- (2) Repeatability is the ability of the output module to reproduce output reading when the same controller value is applied to it consecutively, under the same conditions and in the same direction.
- (3) Rated working voltage is the maximum continuous voltage that can be applied at the terminals with respect to earth ground.
- (4) Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 1000 MHz.

Output Specifications

Specification	Value
Number of Outputs	4 single-ended (bipolar)
D/A Converter Type	R-2R Ladder Voltage Switching
Module Update Time	2.5 ms
Resistive Load on Current Output	0 to 500 Ω (includes wire resistance)
Load Range on Voltage Output	> 1K Ω
Reactive Load, Current Output	< 0.1 mH
Reactive Load, Voltage Output	< 1 μ F
Typical Overall Accuracy ⁽¹⁾	\pm 1% full scale at 0 to 55°C \pm 0.5% full scale at 25°C
Output Ripple range 0 to 500 Hz (referred to output range)	< \pm 0.1%
Non-linearity (in percent full scale)	< \pm 0.5%
Open and Short-Circuit Protection	Continuous
Output Protection	\pm 32 mA

- (1) Includes offset, gain, non-linearity and repeatability error terms.

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Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

WARNING**EXPLOSION HAZARD**

- Substitution of components may impair suitability for Class I, Division 2.
 - Do not replace components or disconnect equipment unless power has been switched off.
 - Do not connect or disconnect components unless power has been switched off.
 - This product must be installed in an enclosure.
 - In Class I, Division 2 applications, the bus connector must be fully seated and the bus connector cover must be snapped in place.
 - In Class I, Division 2 applications, all modules must be mounted in direct contact with each other as shown on page 5. If DIN rail mounting is used, an end stop must be installed ahead of the controller and after the last 1762 I/O module.
 - All wiring must comply with N.E.C. article 501-4(b).
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Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

AVERTISSEMENT**DANGER D'EXPLOSION**

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
 - Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée.
 - Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée.
 - Ce produit doit être installé dans une armoire.
 - Pour les applications de Classe I, Division 2, le connecteur de bus doit être correctement installé et son couvercle enclenché.
 - Pour les applications de Classe 1, Division 2, tous les modules doivent être installés en contact direct les uns avec les autres, comme indiqué page 5. Si on utilise le montage sur rail DIN, une butée doit être placée à l'avant de l'automate et après la dernière unité d'E/S 1762.
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